STRATEGY RESEARCH PROJECT

WHENCE THE ARMY'S ROLE IN SPACE?

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ABSTRACT

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The performance of our military in the Gulf War and more recently in the military effort in Yugoslavia has demonstrated overwhelming US superiority in Space. Future conflicts may be different, as our adversaries come to recognize the importance of Space as a combat multiplier. There will likely be a battle for control of Space during future conflicts. With this in mind, it is useful to ask what the Army role should be in Space. Today, the Army is the largest military user of Space-derived products. Yet it plays only a minimal role in the decision making process that determines our direction in Space. In this study, I will review the history of the US military in Space and the roles played by each Service, with a particular focus on the Army role. I will make predictions about the future role of Space in military operations, and recommendations for what role the Army should play in Space.

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WHENCE THE ARMY'S ROLE IN SPACE?

The United States Congress established a bipartisan commission on Space during fiscal year 2000 that included experts from the private sector, Congress, and the Executive Branch of government, to address our National Space Policy. The commission published a report on 11 January 2001, which made recommendations for future Space efforts that will protect our military and commercial interests in Space.[1] They concluded that organizational and managerial changes are needed at the national level in order to maintain our lead in Space and to protect our Space assets from hostile attack by our adversaries. They also recommended that the Air Force, which today manages over 85% of all military Space assets, continue its leading role as the proponent for Space among the military services.[2] In the wake of that report, and as we move at the national level to implement the commission's recommendations, it seems relevant once again to ask the question: What role should the United States Army play in Space?

The Space age is still relatively in its infancy, having begun in earnest only some 44 years ago with the first satellite launches by Russia and the United States in the late 1950's.[3] In one sense, we have only scratched the surface of capabilities that Space can provide. And yet we have become heavily dependent already, both commercially and militarily, on those limited, but powerful capabilities. The Congress correctly recognizes, with the chartering of the Space commission, that our nation needs a new and reinvigorated approach to Space. A new approach will ensure that we gain maximum return on our investment, and a reinvigorated approach will help to maintain our advantage over potential adversaries. As we determine the proper course for our future in Space, we can make useful comparisons between today's challenges and those faced by our nation's leaders in the 1950's as the Space age was beginning. With the benefit of hindsight and evidence of our successes and failures of the past, let us pursue the proper course in Space for the future.

THE EARLY YEARS: POST WORLD WAR II TO 1960

Our race to Space began in earnest during the years that followed World War II, as a result of attempts to build long-range missiles for military purposes. The victorious Allied Forces captured German rocket scientists renowned for the German V-2 rocket that terrorized London during the course of the war.[4] The Soviet Union and the United States, allies during the war, were on the doorstep of the Cold War that would follow. Each side was anxious to learn of the German rocketry, which was far ahead of their own efforts. The United States also found itself

in an unfamiliar role as a global superpower. That, along with the Atomic Bomb as a new weapon in our arsenal, created wide divisions among the US military Services. Each Service had its own idea about how to approach the new challenges of strategic defense in our role as a world superpower. And nothing was more divisive than their individual approaches to the Atomic Bomb: building it, the evolving doctrine for its use, and the means of delivering it on future battlefields caused serious infighting among the Department of Defense. General James M. Gavin, the Chief of Research and Development for the Army in the 1950's, reflected that "each Service's view of the bomb reflected its background and tradition, and hence its role in national defense of the future."[5] The fierce competition that occurred over these issues in the 1950's would play a determining role in our Space missions and capabilities of today.

THE ARMY POST WORLD WAR II SPACE ROLE

The American Army captured the heart of the German team of rocket scientists, led by Dr. Werner von Braun, as the war in Germany came to an end. More than 100 scientists accompanied von Braun as he purposefully made his way into American hands in the spring of 1945.[6] Von Braun came to the United States with visions of manned Space and interplanetary travel, but few leaders at the time shared that vision; there were more pressing concerns about the Cold War and the potential for Nuclear annihilation here on earth. And so, if von Braun wanted to pursue his ambitions in Space, it would have to be on the backs of the military machines that could provide the capital investment in missilery. Army leaders quickly recognized the military value of the long-range guided missiles that von Braun was capable of building. He became the brains behind the newly created guided missile program for the Army.[7] After test firing dozens of captured German V-2 rockets at White Sands Missile Range in New Mexico, they produced several successful American-made missiles over the next decade, beginning with the Corporal and followed by the Honest John, the Sergeant, and the Redstone rockets.[8]

The Army missile efforts were progressing nicely through the mid 1950's. In the fall of 1955, the Army Ballistic Missile Agency was established, and continued the work of extending the range of Army missiles. Then, in November 1956, Secretary of Defense Charles Wilson rather suddenly released a "Roles and Missions Directive" that, for the first time ever, placed a range limit (200 nautical miles) upon any Army developed missile.[9] The Army guided missile program was being officially curtailed because of stated duplication in the three Services.

Von Braun's vision of Space travel continued through the 1950's, but the Eisenhower administration was slow to recognize the importance of Space. And so when the Soviets

launched Sputnik in October 1957, it caught the US administration completely by surprise. The Soviets had beaten us into Space. But even more surprising to Eisenhower was the alarming response by America and Americans to this important first step in Space for the world.[10] An awakened President quickly gave the go-ahead to the Army team to get the United States into Space as quickly as possible.[11] The Army, with Von Braun leading the way, delivered magnificently on his order by launching the first free world satellite, Explorer, within 4 months.[12] There were other successes for the Army, to be sure, including leading efforts in missilery, missile defense, and ground terminals over the years that continue today. But in a larger sense, the Army failed to capitalize on the talent that literally fell into their hands after World War II. For the past 40 years, the Army has largely stood on the sidelines while the other Services designed and launched Space systems that we use today. Our military has communications, sensors, and navigation systems in Space today mainly because of Air Force, Navy, and other government agency efforts since that historic first launch by the Army in 1958.

It is indeed ironic and more than a bit curious that the Army, which had all of the German expertise and a significant technical lead back then, plays such a minor role in Space today. As we move to determine today's proper role for the Army in Space, it can be revealing and helpful to look at the cause for our failure to capitalize on this advantage that we had during the post World War II era. While there are many stated reasons for the Army's loss of the high ground, I believe that the single most important reason is that the Army leadership simply lacked the vision to see the military advantage that Space would bring to the future battlefield. Instead, their focus was on dramatic cuts in Army end strength that were looming, as the Eisenhower administration attempted to erase a post-Korean War budget deficit by making reductions in the military budget. Generals Ridgeway and Taylor, the consecutive Army Chiefs of Staff in the early to mid 1950's, found themselves alone in a battle to maintain a large peacetime Army at the expense of a cheaper military policy of Massive Nuclear Retaliation, which the newly created Air Force was pressing. The Army leaders did see the potential value of long-range missiles on the tactical battlefield, and they gave strong support to the von Braun team in that regard. But as the inter-Service competition for missilery heightened, the Army, without a broader vision for Space, continually found itself the "odd Service out" when it came to dealing with the Executive and Legislative Branches on Space and missile issues.

THE AIR FORCE AND NAVY POST WWII SPACE ROLES

The Army freely shared the knowledge and expertise of the German team with other Services.[13] And the Air Force and Navy weren't so timid when it came to advancing their own

Space interests. While the Army considered guided missiles a logical extension of artillery, the Air Force contended that they were unmanned aircraft, and should therefore fall into the Air Force domain.[14] The Air Force, in contrast to the Army, had a clear and exciting vision of what Space could deliver in defense of our nation. And they backed up that vision with a very aggressive approach to building a Space program, starting at the highest levels in the Air Force. Beginning in the late 1940's, they dedicated a core of senior officers to the effort[15], built a strong and diverse team of industry and Congressional support, and gained seats on key committees in the Department of Defense that would steer decisions on Space issues.[16] The Air Force seized the initiative on the new US strategic mission, establishing an alliance with the CIA that would lead to the creation of the National Reconnaissance Office (NRO). This team pioneered highly classified efforts to develop imaging satellites with overhead reconnaissance capabilities that would provide incredible insights into Soviet capabilities. One could argue that this contribution, which came at a critical time during the Cold War, is the most valuable of all military Space efforts. President Johnson certainly felt that way, stating in 1967 that[17]:

> ....we've spent thirty-five or forty billion dollars on the Space program. And if nothing else had come out of it except the knowledge we've gained from Space photography, it would be worth ten times what the whole program cost. Because tonight we know how many missiles the enemy has....

That the Soviets weren't standing still helped the Air Force effort by creating a sense of urgency about the situation. There was a real concern, in those early days, that we were second rate when it came to space technology. The Soviets were, by most accounts, leaving us behind in a cloud of dust in the race to Space. The Air Force vision was backed up by a well-coordinated approach that sold well to the Congress and Executive branches as the country was becoming more and more concerned about the growing Soviet menace. The roles and missions battle over missile development, which the Air Force considered only a subset of their overall goals in Space, continues still today. The Air Force still presses to limit the reach of Army missiles on the battlefield while the Army wants them to reach ever deeper behind enemy lines. The Air Force also saw their Service as the proponent for strategic, intercontinental ballistic missiles that could be used as a second strike threat to deter the Soviets from launching a first strike against the United States. This idea won favor with President Eisenhower who was, as mentioned above, very much interested in significant reductions in military spending.[18] To him, this strategy would enable large, cost saving cuts to the Army while at the same time preserving our national defense with the more cost effective strategic missile program. The Air Force clearly won the roles and missions battle for Space, and went on to develop and build an

outstanding fleet of Space products. They proudly claim credit for most of the launch systems, navigation satellites, military communications satellites, and surveillance and meteorological satellites that we use today.

The US Navy has the dubious honor of losing the initial leg of our race to Space with the Soviets. Secretary of Defense Wilson had given the responsibility for the first satellite program to the Navy, while the Army effort was prohibited from proceeding.[19] Early Navy efforts to test their Vanguard missile were fraught with cost over-runs and failures, and as the world learned of Sputnik, there was still no end in sight for Vanguard problems.[20] The Vanguard program eventually fizzled out, with a miserable record of performance.[21]

But the Navy was also progressing quite nicely on other programs of tremendous import to our nation. Navy leaders learned of German efforts, for example, during the war to develop underwater missiles. Such missiles could be launched from a submarine to attack targets on land. They quickly saw the strategic advantage, in the atomic age and with the emerging strategic deterrence concepts of the US, of being able to hide missile launchers on mobile submarine platforms at sea. Such platforms would be virtually impossible to detect, and would add to our deterrent strategy of preventing a first strike by the Soviets. Any potential aggressor would have to think twice before risking a nuclear war under these conditions. And so, with technology breakthroughs in safer solid rocket boosters, began the Navy's Polaris program, which would eventually form one leg of our nuclear deterrence "triad."[22] The Navy's first live fire of a Polaris missile took place in 1960. This is one example of a unique Navy application for missiles that would protect their role in Space for years to come.

The Navy was also very interested in using satellites for communications and navigation at sea, where terrestrial systems were limiting their movement. Space relays for their communications systems would allow unprecedented continuous, worldwide communications with their forces. They began by designing a series of communications and navigation experiments in the early 1960's (that were launched into orbit by the Air Force). One of the earliest Navy experiments with Satellite Communications (SATCOM) was called ECHO 1, conducted in 1960, led to future families of SATCOM designed by the Navy and in use today. Early navigation satellites included the Transit and Timation Spacecraft. And, although somewhat primitive technology, these satellites were used to help ballistic missile submarines fix their location with reasonable accuracy, and they eventually led to today's NAVSTAR Global Positioning System (GPS) that was built by the Air Force in the 1970's.

MILITARY SPACE EFFORTS: 1960 TO 1980

This was a time of quiet confidence and accomplishment in Space, mostly on the part of the Air Force. By 1960, their efforts to become the US Defense leader in Space had paid off. The growing Space mission increased their relative portion of Defense spending, as the systems being launched proved very costly. The Army lost the bulk of its German team to the newly created National Aeronautics and Space Administration (NASA) in the waning days of the Eisenhower administration[23], putting them almost completely out of the Space business. The final nail in the coffin occurred in 1961, when the new Kennedy Administration formally named the Air Force as the military proponent for all Space derived products.[24] The next two decades would be a time of enormous triumph and accomplishment for the Air Force in Space, and a time when the United States caught up with and overtook the Soviets in the Space race. It was mainly a time of Strategic use of satellite systems in the military. The 1960's brought reconnaissance, surveillance, and communications satellites that gave us a huge leap in strategic military capabilities. We could now see and hear what was happening behind the iron curtain with amazing clarity, where before we knew almost nothing of their capabilities. And worldwide, instantaneous communications made possible with satellite communications gave us a greatly improved ability to command and control our forces at the Strategic level.

The Navy role was limited to efforts narrowly focused on their maritime role. They were the first military Service to use Space systems at the Operational/Tactical level. Their advantage was that their ships could handle the large, heavy, and otherwise immobile earth terminals associated with the early Space systems. Whereas the other Services needed lighter and more mobile terminals to evolve before they could use them at the tactical level.

The Navy also made great progress on their underwater missile programs during these decades. They produced and deployed three generations of the Polaris missile on nuclear powered submarines through the 1960's, forming a strong third leg of our strategic nuclear triad. The Poseidon missile later replaced the Polaris in the 1970's.[25]

The Army, having lost most of its German team to NASA and the Space mission to the Air Force, was relegated to the back seat in Space during this timeframe. Their work in missilery continued, including ground-to-ground missiles for battlefield use and some very impressive technology work on missile defense systems. But they had only minor participation in the design and launch of Space systems that would come to revolutionize the tactical battlefield.

MILITARY SPACE EFFORTS: 1980-PRESENT

As mentioned above, the associated ground terminals in the early days of the Space age were large and heavy. They also tended to be shrouded in secrecy because of the tremendous advantage that the technology gave to our side. These factors, along with the very high costs of Space systems, prevented their large-scale tactical use at the time. But in the late 1970's, the Services started to take notice of the tremendous capability that Space could bring to the tactical battlefield. Leaders began to ask that Space systems reach down to tactical levels, so that Commanders on the battlefield could use them. Each Service created a Space Command that would be used to leverage existing Space systems and to drive requirements for future systems that would be launched.

Advances in electronics technology in the 1970's and information technology in the 1980's led to significant improvement in capability and miniaturization of ground components, making these same systems ideal for use on the battlefield. Army program offices initiated programs that would build mobile, tactical communications terminals that could use spare channels on already orbiting communications satellites. The GPS navigation system of satellites would come to revolutionize the accuracy of our weapons systems. The Army Space Program Office initiated the TENCAP (Tactical Exploitation of National Capabilities) program, which produced terminals that would bring products from strategic space sensors directly into the tactical battlefield. The Navy and the Air Force quickly followed suit with their own TENCAP-like program offices. These terminals, along with a multitude of mapping and other space sensors orbiting the globe provide an unprecedented view of the battlefield for today's battlefield commanders. They also create a dependence on Space from which we cannot turn back; our commanders and soldiers have come to depend on the improved quality and service provided by space products.

The culmination of efforts in space during the early years, spearheaded mostly by the Air Force, paid off for us with victories in the Cold War and on the battlefield. Our victory in the Cold War was made possible, in part, by the tremendous strategic advantage our Space systems gave us over the Soviets. And the performance of our military in recent conflicts (the Gulf War in 1991 and the military effort in Yugoslavia) has demonstrated overwhelming US superiority in Space. That superiority translates directly into a combat multiplier on the battlefield, as we achieve information dominance over our adversaries. The enemy becomes blind and deaf to activities as they occur, while we can see and hear things as they happen in a near real-time sense.

But some defense experts realize that our advantage in Space can be fleeting. Dr. James Schlesinger, former Secretary of Defense, noted that Saddam Hussein was completely unaware of our Global Positioning Capability during Desert Storm, and as a result he was shocked at the speed with which we moved across the desert. But Schlesinger goes on to say that that unawareness was a one-time occurrence, and does not exist among our adversaries of today.[26] In other words, the rest of the world is aware of our GPS (and other Space) capabilities today, whereas it was a new and unknown capability that worked to our great advantage back then. Not only are they aware of it, the rest of the world has access and can use the capability just as easily as we can. They can also develop measures to defeat or minimize our space assets at critical junctures. And so our advantage has already dramatically eroded over what it was just a decade ago. The erosion of our lead is not limited to navigation; the world has taken notice, and is closing the gap across the Space arena.

FUTURE DIRECTIONS IN SPACE

The bipartisan Space commission mentioned earlier correctly recognized that we dare not mark-time in the US while our adversaries are making strides in Space. Future conflicts will be different than what we saw in the desert, as our adversaries, too, have come to recognize the importance of Space as a combat multiplier. These conflicts, as a result, will almost certainly include a battle for control of Space and include battles *in* Space, something that heretofore has largely been avoided. And so, Space will evolve to even more than the combat multiplier that it is today. It will become the next *Battle-Space*, of equal or greater importance than the air, ground, and oceanic battle-spaces that we know today. The Army that wins the Space battle will have a distinct advantage in the terrestrial battle.

SPACE AND THE ARMY TRANSFORMATION

Today's Army is building and experimenting with battlefield information systems that promise to revolutionize the way we fight. Those systems will give battlefield commanders an unprecedented view of the battlefield, updated at near real time. It is these information systems that will enable the faster, lighter, more deployable, and more vulnerable combat vehicles that we're building to survive on future battlefields. This coming view of the battlefield has never been experienced in the past. And because of the fluid, constantly changing, and growing battlefield environment, Space systems will play an ever-increasing role as part of the information systems that we use. Only with Space products can we provide the continuous coverage, connectivity, and flexible support that will be required to maintain the information

network. We simply cannot depend solely on terrestrial systems to do the job. This theory is reflected in the design of the Interim Brigades, where unprecedented quantities of Space systems have been added that will assist in providing Information Dominance to the Brigade Commander. The Future Combat System will almost certainly depend on Space systems to survive on the battlefield. It is also quite likely that the design of the Objective Force will include Space Control assets that will protect our access to Space while denying enemy use of Space.

The Space systems being designed today will be in use by the year 2032, when the current Army transformation is scheduled to be complete. Much of the focus of that transformation is on the vehicles, i.e. the interim and future combat vehicles, but the real transformation is occurring in the information technology arena. That is where Space will play a critical role, and that is why the Army must play a greater role in planning future Space systems for our military.

THE ARMY'S GROWING ROLE

It's not easy to turn some 40 years of passive Army involvement in the Space arena around. But today's Army leaders are awake to the capabilities that Space brings to the battlefield, and our current Army has become the largest military user of Space-derived products.[27] Virtually every battlefield system that we buy today has an embedded Space component. And we have seen that our dependence on Space capabilities will only increase with the process of the Army Transformation, as we become ever more dependent on network-centric information systems on a fast paced battlefield. But there is much more to be done if we are to realize the huge, untapped potential of Space capabilities. Achieving that potential will require vision, bold leadership, and some tough decisions on the part of the Army.

To begin with, the Army must gain a larger voice in the decision-making process that determines our military's direction in Space. Let's be clear: the Army cannot and should not try to compete with the Air Force for proponency of Space programs. The huge cost of these systems will keep most of the programmatic decisions at the highest levels in DoD anyway. But as the military's largest user of Space products, the Army should insist that ground forces requirements be included in the design of all future systems. The old approach, where we in the Army watched the Air Force and Navy and national agencies (NRO, NSA, etc.) lead the way in Space, to determine what systems and what capabilities should be launched, will no longer suffice. Our almost nonexistent role in developing and launching those platforms makes us a forgotten stepchild when it comes to priorities for use on the ground. The Army Science board recognized this in their summer study in 1999, when they recommended greater visibility and

representation of the ground forces at national level where requirements are generated.[28] And the recommendations of the National Commission for Space, if adopted, will present an opportunity to do just that.[29] The current fleet of satellite systems is aging, and planning is now in progress to replace and improve those systems with the next generation. This is an expensive undertaking, and the requirements prioritization will be a controversial process. We must be ready to speak with one Army voice as these systems go through the acquisition process.

The casual observer might challenge my assertion that the Army has no voice today, citing a strengthened Joint Requirements Oversight Council (JROC) process, where programmatic decisions are made. And, in fact, they would be correct in asserting that the Army has a say in the process. But without the necessary Space expertise to guide Army decision-makers, does the Army really have a voice? Does the Vice Chief of Staff of the Army, our seat at the JROC table, have the necessary tools to weigh Space programs against other important programs? There is no Army budget for Space launch or satellite systems in today's Defense Spending bills and, until recently, we have had few leaders at any level that possess the requisite knowledge about Space to defend our future interests in Space. This is a point of extreme vulnerability for the Army: as the role of Space in our ground forces continues to grow, we remain blindly dependent on what the other Services and Government Agencies do with regard to future Space capabilities. And it's largely our own fault, because of 40 years of neglect and lack of vision. Yet our continuing ability to leverage Space will play a critical role in our success or failure on tomorrow's battlefield. We must gain an *informed* voice in the decision-making process that is building the future space capability.

There are emerging signs that the Army leadership has finally gotten the message on this point. Beginning with several reorganizations that consolidated and focused the Army Space missions in the 1990's, and with the recent creation of a Space Career Field for Officers (FA-40), the Army is forming that pool of expertise that is needed to drive future requirements and Joint programs to meet those requirements. The Army Space and Missile Defense Command[30] was born out of the original Huntsville Army team that launched the first free world satellite in 1958, and includes the operational Army Space Command (ARSPACE), and the Army Space Program Office that builds tactical ground terminals for surveillance satellites. The command billet for ARSPACE was recently elevated to Flag Rank (Brigadier General), and the Army's First Space Battalion (Provisional) was recently activated. This battalion will provide Space capabilities to Army components of Warfighter CINC's by deploying support teams and organically owned equipment. This First Space Battalion complements the Army's First Satellite

Control Battalion, which provides satellite communications support to Army components. The Functional Area 40 (Space Operations Officer) was created in 1998, and has grown to include 112 authorized billets with a current fill of 70 Officers.[31] These numbers are not sufficient, as we'll see below, but they are a good start. Company grade officers are being assessed into FA40 from all Branches, including most importantly the Combat Arms Branches, where we desperately need to bring knowledge of Space capabilities. FA40 officers will serve as staff advisors at Corps levels, and in limited Joint assignments at US Space Command, the NRO, and on the Joint Staff. An Army vision for Space is also now on the table[32], and will serve to prioritize our requirements in the Joint arena.

Further steps are also needed. Consider the table below, which shows total Army and Air Force authorized Space officer positions throughout DoD.

	Air Force[33]	Army[34]
COL	56	2
LTC	156	29
MAJ	286	36
CPT	1091	3
LT	912	0

A COMPARISON OF TOTAL CURRENT AIR FORCE/ARMY SPACE POSITIONS

Note how out-manned the Army remains in the Space arena. Walk through any office at the NRO, US Space Command, NORAD, or on the Joint Staff, and you'll see this imbalance reflected in the personnel present. This table shows only the Officer figures, but the numbers are even worse across the NCO grades and Army Civil Servant sector. To protect Army interests in Space, our Army leadership must step up to the plate here, and continue to grow the Army Joint Space billets at both NCO and Officer levels. We should press for Army opportunities to fill key Joint positions, such as CINCSPACE and the Deputy Director for Military Support at the NRO.

The Army must also be prepared to commit funding to efforts that it deems important. Some requirements are uniquely Army, and will require funding out of the Army budget. This means making tradeoffs against other important requirements and the tough decisions when prioritizing the budget.

SUMMARY AND CONCLUSIONS

The Army's future in Space is one of hope and opportunity. The recent increase in emphasis on Space support at the tactical level is a good thing, and has resulted in a tremendous increase in capability for the Army across all functional areas. There are also signs that, following our victory in the Gulf war and with the obvious advantage gained there by using

Space products, the Army leadership has taken notice. Today's Army leaders are awake to the importance of space across all functional areas, to its potential as a combat multiplier, and to the vulnerability introduced by our lack of influence in Space. The Gulf War served, in effect, as a wakeup call to our leaders. Since that war we have seen the creation of a consolidated Army Space Command (the Army Space and Missile Defense Command), the creation of an Army vision for Space, and some limited steps to create a cadre of Space expertise inside the Army. The recent creation of the Space Functional Area for officers is continuing to build that pool of expertise. These measures, however, do not go far enough. The Army must engage in Joint requirements prioritization and planning for Space systems at the national level. And they must play a greater role in the design of future Space systems than we have in the past. Informed input from the largest user of Space-based products will help us collectively avoid wasteful spending of taxpayer dollars, and most importantly will minimize the risk to our Army on future battlefields.

The Space Commission's recommendations to adjust our Space programs at the national level also present the Army with a new opportunity to get back into the Space arena. Clearly the Air Force will remain the lead Service in the procurement of Space systems, and that is appropriate given their longstanding success and investment in Space. But the Army must gain a voice up front in the requirements that drive these *national* programs. This will take more than lip service. In order to build the necessary knowledge base that will be required, the Army should build upon the steps taken in recent years to (1) introduce additional courses on Space at all leadership levels to educate the whole Army (and not just FA 40), (2) continue to grow the Space Functional Area by adding significant and key Space personnel billets at the joint level, (3) create incentives for soldiers at all levels to move into those Space career fields. The Army should also press for Army Flag representation in key Space billets, such as CINCSPACE and the NRO Deputy Director For Military Support, positions typically manned today by Air Force General Officers. The Army must also be prepared to ante up fiscally when necessary to support unique Army requirements in Space, instead of simply holding our hand out to other Services and expecting them to carry our load. These are tough, challenging decisions that will require bold leadership at the highest levels in the Army. But the benefits of renewed influence on Space requirements will give the Army the best chance of victory on the future battlefield.

WORD COUNT=5513

ENDNOTES

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[6] Erik Bergaust, Reaching For The Stars (Garden City, NY: Doubleday & Company, 1960), 114.

[7]Ibid, 120.

[8] Bergaust, 166.

[9] Bergaust, 205.

[10] Ambrose, 422.

[11] Ibid, 428.

[12] NASA Fact Sheet, The Jet Propulsion Laboratory, page 2.

[13] Bergaust, 194 and Gavin, 185.

[14] Ibid, 162.

[15] Department of the Air Force, Air Force Space and Missiles Pioneers, available from <http://www.spacecom.af.mil/hqafspc/history/glasser.htm/>; Internet; accessed 11 March 2001. This Air Force Space Command web site identifies several Space pioneers during those early years. Names like Franklin Collbohm, Richard Curtin, Otto Glasser, William King, Frederic Oder, Simon Ramo, Osmond Ritland, Bernard Schriever, and Charles Terhune. All were instrumental in the early success of the Air Force Space and Missile programs.

[16] Ibid.

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[18] Ambrose, 435.

[19] Ambrose, 427; and Medaris, 182; and Bergaust, 312 all discuss the scuttling of the Army program because of inter-Service rivalries.

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[24] Department of the Air Force, Air Force Space and Missiles Pioneers, available from <http://www.spacecom.af.mil/hqafspc/history/glasser.htm/>; Internet; accessed 11 March 2001.

[25] Charles Stark Draper, Polaris Missile; available from <http://www.britannica.com/seo/p/polaris-missile/> or http://www.fas.org/nuke/guide/usa/slbm/a-1.htm; Internet; accessed 11 March 2001.

[26] Dr. James Schlesinger, "Defense Issues," lecture, Washington DC, The Defense Forum Foundation, 26 January 2001. There are also a number of other articles and books written on this subject. See, for example, Aviation Week and Space Technology, 1 January 2000, "Space Superiority is Fleeting" by General Richard B. Meyers.

[27] LTG John Costello, "Space Mix Study," briefing slides, Alexandria, VA, Army Space and Missile Defense Command, March 1999.

[28] Department of the Army, Army Science Board Summer Study, "Prioritizing Army Space Needs," July 1999, 58.

[29] National Commission to Assess the United States National Security, Space Management and Organization, pursuant to Public Law 106-65, "Report of the Commission to Assess the United States National Security, Space Management and Organization," 11 January 2001, page ix, states: "The U.S. Government-inparticular, the Department of Defense and the Intelligence Community- is not yet arranged or focused to meet the national security space needs of the 21st century." This creates an opportunity for the Army to gain a larger voice in the requirements and prioritization process.

[30] Department of The Army, "History of the Space and Missile Defense Command," available from http://www.smdc.army.mil/; Internet; accessed 11 March 2001.

[31] Major John McDaniel, "FA 40 Space Operations," briefing slides, Alexandria, VA, US Army Personnel Command, 21 January 01.

[32] COL Glenn Collins of Army Space and Missile Defense Command, telephone interview by author, 3 March 2001. COL Collins, the Director of Force Development and Integration Center, stated that SMDC is spearheading an integrated Army strategy for Space, including prioritization of requirements and a Space annex to the Army Modernization Plan.

[33] Department of the Air Force, Air Force Personnel Center, "Current Active Air Force Officers, by Career Families"; February 28, 2001, available from <http://www.afpc.randolph.af.mil/demographics/demograf/CAREER.html>. Internet; accessed 11 March 2001.

[34] Department of the Army, PERSCOM, "FA 40 Space Operations"; available from <http://www.perscom.army.mil/opfamio/fa40.htm>. Internet; accessed 11 March, 2001.

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